

DPR for NIMB

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Strategies for understanding the ecology of organisms before probing them for application value would be the need of the hour. Moreover, it would be pertinent to put ecological perspectives in place for efficiently harnessing marine living resources. Bioactive molecules have been hitherto explored with least considerations of these aspects of ecology. However constitutive the production of a certain metabolite could be, microbes delinked from their ecosystems may not produce a compound optimally or consistently. To address these aspects it would be fundamental to understand the production of a certain metabolite in response to the contextual parameters including geographical location and environmental variables. Emergent properties of interactions and the products thereof would give a new angle to bioprospecting microbes especially from extreme environment. Microorganisms are known to be pivotal to these processes and insights into their lifestyle and fitness would augment and refine our ability to harness their potential. Such understanding of ecosystems in both spatial and temporal dynamics would help harness resources in a more consistent and sustainable manner. Hence an underlying theme for harnessing of important bioactives could be “driving environmental interactions for the phenotypic expression of “X”(particular compound). With high throughput screening and software to analyse in place such an initiative could be encouraged.

Microbial resources have always been in demand either for their most valued secondary metabolites or the bioremediatory processes which they mediate. Amongst all physiological groups of bacteria extremophiles are mostly sought after as they are interesting to both basic and applied biologists. These organisms hold many exciting biotechnological potential, such as the biochemical extremes to macromolecular stability and the genetic basis for constructing macromolecules stable at different extreme conditions. The microorganisms have yielded an amazing array of enzymes capable of catalyzing specific biochemical reactions under extreme conditions. Such enzymes are in high demand in biotech industry for diverse applications.

Another important realisation that has emerged from the study of extremophiles is that some of these organisms form the origin of life itself. Many extremophiles, in particular the hyperthermophiles, lie close to the 'universal ancestor' of all extant life on Earth. Thus, an understanding of the basic biology of these organisms is an opportunity for biologists to 'look backward in time' at a period of early life on Earth. This fascinating realisation has fuelled much research on these organisms in order to understand the nature of primitive life forms, how the first cells 'made a living' in Earth's early days, and how early organisms set the stage for the evolution of modern life forms. Most importantly they have withstood the test of time and therefore have high application potential with their characteristics that link the extant to the extinct.

As I was one of the committee members involved in preparing NIMB, I support the idea that it should take shape as a cluster of organizations with complementary skills with one or two Institutes involved in oceanographic studies acting as the main nodes. As some time has passed since it was developed new ideas and directions can be considered to hone and evolve it further. At the moment, an important complement that could be added is a unit that handles ecology and its role in the expression of a particular metabolite (ie product) or process of interest. (I second Dr Karthik Shanker's view on this score). Including laboratories that simulate natural systems (read host symbiont interactivity) would help harness molecules of interest consistently ex situ. Such an approach would be necessary to be applied to cases where cloning and expression in suitable vectors or synthetic analogues or derivatives may not yield the expected results as the natural ones..

The initial phase could be devoted to identifying the core expertise and co-ordinators who could inspire and motivate teams to synergise and **meet defined targets in stipulated time.**